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ABSTRACT

Presented is the final formative evaluation report on "Me and My Environment," a 3-year multimedia environmental sciences program developed for 14 to 17-year-old educable mentally handicapped (EMH) children by the Biological Sciences Curriculum Study (BSCS). Discussed are the goals of employability and personal independence for EMH children and the role of science education in helping to reach these goals. An overview of the components of the BSCS EMH science curriculum and of the curriculum development model are provided. Factors which influenced the decision to conduct a formative rather than a summative evaluation are noted. Listed are the titles, categories (such as filmstrip or student booklet), lengths and unit numbers of published materials in "Me and My Environment." A guide to the contents of the five formative evaluation reports includes the type of information, report number and page number, and a brief description of the contents. (LS)

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ME AND MY ENVIRONMENT
FINAL FORMATIVE EVALUATION REPORT

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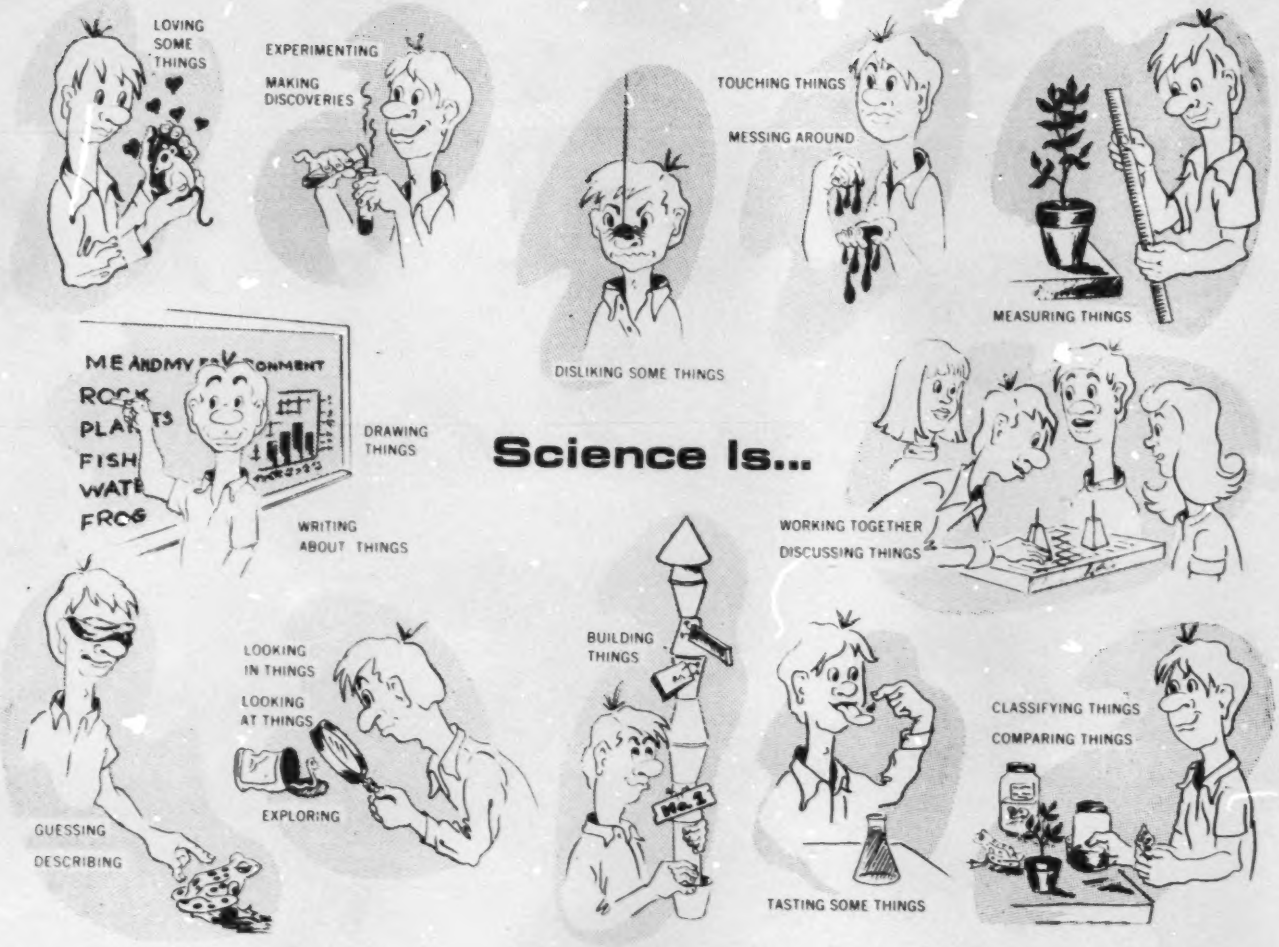


the context for this report

The EMH Aim: A Declaration of Independence

Employability as the aim of educating mildly retarded or EMH children (educable mentally handicapped) brings value judgments into play. If it is viewed only as a practical measure it can be criticized as unfeeling, or even as embarrassing to a society that by reputation "takes care of its own" [implying its "less able" or "less fortunate"].

But the aim can be expanded, as in

> *enabling the individual to grow in independence and become a contributing member of society,*

where its latitudes appear more open. Feeling and effort—along with other human involvement—are no longer in question, but clearly there. The question becomes whether these characteristics, as well as *employability* vs. "contributing member of society," are differences between the two statements of aim, or only different inferences.

The American Association on Mental Deficiency resolves one uncertainty over differences between the aims with a definition:[3]

> *contributor to society*: an individual who is able to perform an act which is necessary and would have to be paid for if done by another individual.

In this context a person able to care for his or her own needs would be considered employed. Whether further employed or employable at a self-supporting or partially self-supporting job—a *paying* job—is the broader context in which the aim best fits *pro* and *con* analysis. Either meaning, and usually both—self-care and self-support—are appropriate to the discussion here.

In the short form of the aim, *employability*, it is clear in representing its advantage to society. employable individuals work an enormous saving over the cost of their

support by families or by charitable or state institutions. (This is the presumable source of embarrassment to society in acceding to the aim.) And as *employability*, it also fits the starkness of the consequences of living with a handicap: EMH children can only endure others' toleration and support of them as off-target human wards, or else they must grow in self-image and win acceptance and relative freedom.

At stake for each EMH child are the most rewarding relationships and qualities in life:

- fellowship and friends (peer-relations), gradually replacing supervisory relationships;
- mobility, or freedom of access to any place, any activity, or any person at any time, as choice may be exercised;
- normal home and family life, with adolescent and adult options (dating and marriage).

The same list for those who remain dependent reads:

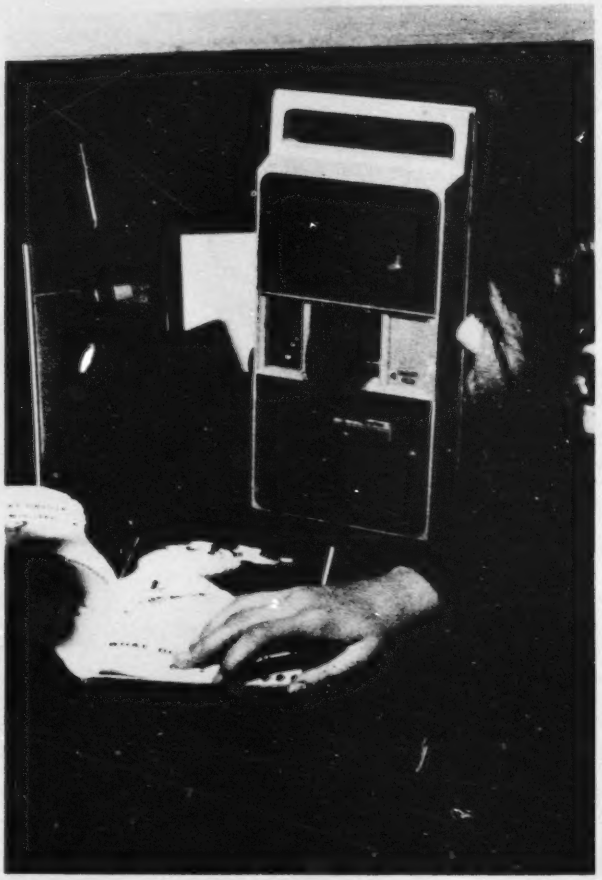
- decreasing but permanent supervisory relationships, with compassion, tolerance, or patience (occasionally cruelty);
- mobility "with advice or suggestion" on propriety, time, places and distance, cost, and purpose;
- "circumstantial" home arrangements with full or partial economic dependence and restraint (community-sanctioned guardianship and isolation from marriage).

EMH individuals are not insensitive. There is no evidence that they are not moved as fully as others by the same forces, passions, and elements that affect others. Some views find them altogether normal, but at a different place on the curve of distribution of mental ability.

And so a different view emerges of the generosity of a society that lives up to its reputation and "takes care of its own." And a different reaction replaces the inferred criticism that employability is a practical word that does not carry feeling. (How else can EMH individuals win freedom from others economically?)

Society in day-to-day encounters classifies adults by age, sex, political and religious affiliations, income, credit rating, social security number, hair and eye color, height, weight, blood type, and even by TV-viewing preferences along with an unlikely host of other characteristics—but not by IQ. Friends and acquaintances are made in the same, in neighboring, and (less frequently) in widely separated ranges of mental capability. Getting and holding a job, making friends, and doing reasonably well at managing personal affairs is less hazardous with the increasing flood of community services to adults having trouble with bank balances, income tax forms, credit payments, personal-social relationships, and many other day to-day affairs. Each of these evidences relates to the aim (and potential) for educating the EMH population.

This brief analysis and reasoning—all of it—was current when the Biological Sciences Curriculum Study became aware, over a span of eighteen months in 1968 and 1969, that EMH children ordinarily either used science materials prepared for others, or none at all.



Science for the Handicapped

To the question of why science had not entered special education classrooms more successfully, or why it had not entered at all, a response in several parts was obtained:

1. Many special educators held an image of science that obstructed their view of its "common sense" foundation in inquiry methods and skills for solving everyday (as well as scientific) problems.
2. Most special educators were not trained in science and were unsure of the criteria for success of a science program for EMH children.
3. The science programs that existed and were used in some EMH situations were not widely known apart from programs used with regular classes in the same or neighboring schools.
4. Science was considered difficult for EMH children in its subject matter and methods of investigation.

By correspondence and personal contact, BSCS curriculum developers turned up more than fifty science

syllabi from various K-12 programs in special education in different regions of the country. That they existed and were not more widely known followed from the responses already obtained. That they represented the nucleus for a new curriculum-development effort was found discouraging, though they were in many instances helpful to developers without previous background in special education.

Although nowhere was there clear evidence that science had succeeded in EMH classrooms, or that EMH students could not succeed without science, "scientific method" and its activity-centered ("hands-on") approach seemed naturally to support habits of thought and doing that could contribute to the compelling need for growth in independence for the students. At an elementary level in science inquiry were:

- working with the hands (and eye-hand coordination);
- learning the nature of problems;
- talking things over with others, to help find ways to try solving the problems;
- deciding on approaches to try;
- taking steps one at a time;
- taking steps in reliable sequence;
- making observations at each step;
- relating the observations to the problem;
- drawing conclusions;
- applying (testing) conclusions;

and

- predicting, in related problem situations as they occur in the future.

These methods of inquiry could be applied with equal effect to science problems and to everyday problems the students would recognize from their own lives. The latter would be relevant, and the science problems, whether relevant or selected for success or multisensory appeal, would contribute to the most necessary daily habits:

- questioning directions;
- understanding directions;
- following directions;
- understanding the result.

Science is also unique in that it may be successful even in failure, given what is learned in unexpected results. (The need of EMH students to accommodate to failure as well as success is unavoidable; finding that it is part of the game in science is a novelty.)

Science touches almost everything that grows or is made. Because the options in content are so great, it seems natural that

1. Nearly every student could find activities in science that permit him or her to be successful.
2. Some students could find interests that would persist and be related to their future lives.
3. Some would even be attracted to job possibilities related to science activities.

For every scientist another hundred people work in vocations related to science, and another thousand perform "leisure" work affected by science, so that science studies can be deemed career-oriented in each sense implied by Kenneth B. Hoyt's definition of career education: "Career education consists of all those activities and experiences through which one learns about work."[4]

Science can also be "society-oriented" in that life and society are still growing increasingly technological; "hands-on" opportunities to work with different or new equipment and materials are helpful when these are related to conveniences of living or to attitudes of trying new things without fear.

Much more could be argued, but only one other set of circumstances involving all people everywhere will be noted. People are growing in numbers; resources are decreasing in amounts; pollution and other environmental problems will go on accelerating. These are concerns that individuals cannot solve, but that they must know about according to their cognitive levels and aptitudes. Some things *can* be done constructively by individuals, and EMH students could experience success here, too.

As all these propositions bearing on science for EMH students were being considered by the Biological Sciences Curriculum Study, related events were underway elsewhere. The Bureau of Education for the Handicapped, U. S. Office of Education, was reviewing curricula for mentally retarded children in *all* subjects. Concerned with the age or objectives of these curricula and the incompleteness of reported new curriculum-planning, the Bureau took steps to address both problems. Over the next five years it funded the development of new programs in reading, daily living skills, social learning, mathematics, physical education, and science. Then it directed the cooperation of the staffs of these projects to the analysis of curriculum-planning itself, and funded an inter-project series of conferences to prepare a monograph or guide on curriculum development. The monograph, *PLANNING CURRICULUM DEVELOPMENT: With Examples from Projects for the Mentally Retarded,* was to be designed to make the exacting requirements and processes of curriculum development more accessible to others, from whom the Bureau hoped to get closer attention to the requirements of effective curriculum-planning in future years than in those past.

The science programs that were funded, and the central or coordinating role for the inter-project conferences and the publication on the curriculum-planning process, were made the responsibility of the Biological Sciences Curriculum Study.

the BSCS-EMH science curriculum

ME AND MY ENVIRONMENT and Its Place in Sequence

Three sequential science programs were funded for development by the Biological Sciences Curriculum Study. They are:

ME NOW, a two-year life sciences program for 11- to 13-year-olds;

ME AND MY ENVIRONMENT, a three-year environmental program for 14- to 17-year-olds;

ME IN THE FUTURE, a science-oriented career education program for secondary students.

ME NOW was the first-funded program (1969) and the first to be developed, field-tested, evaluated, and revised for general use in EMH classes. It is directed toward an increased understanding of *self*, and it uses the students themselves, a model torso with working parts, and an assemblage of specially created multi-media materials plus firsthand, "living" experiments to build a basic understanding of the body and how it works. Its development and evaluation are described in the two evaluation reports published for it;[10,14] a brief summary of its overlapping developmental planning with that of ME AND MY ENVIRONMENT is given in Formative Evaluation Report 3 (pp. 4-5) for

the latter program.[13] ME NOW has been produced commercially and is available from HUBBARD SCIENTIFIC COMPANY, P. O. Box 105, Northbrook, Illinois 60062.[9]

ME AND MY ENVIRONMENT builds on the concept of self and guides students through an exploration of their environment and their interrelationships with it. It was funded in 1971 and has been under development for five years. Units 1 through 4 have been field-tested twice and evaluated and revised twice. Unit 5 has been field-tested, evaluated, and revised once.

The five units in ME AND MY ENVIRONMENT are:

Unit 1. Exploring My Environment (one year)
Unit 2. Me as an Environment (one-half year)
Unit 3. Energy Relationships in My Environment (one-half year)
Unit 4. Transfer and Cycling of Materials in My Environment (one-half year)
Unit 5. Water and Air in My Environment (one-half year)

Units 1 through 3 have been released commercially, Unit 4 has been completed and is in commercial production at the time of this report, and Unit 5 has just been completed and will be in commercial production before Unit 4 is released by the producer, HUBBARD SCIENTIFIC COMPANY.[8] By the fall of 1976 all five units will be available to special education classes everywhere in the United States.

Like its precursor (ME NOW), ME AND MY ENVIRONMENT is a multi-media program. The sustaining rationale, activity pattern and sequence, descriptions of the learning situations, and anticipated student and teacher dialogues (recorded and reported from the field tests) all appear in the Teacher's Guides. Students work with illustrated worksheets, brief booklets, slides, filmstrips, film loops, action games, board games, wall posters, study prints, models, sound tapes, living plants and animals, microscopes, hand lenses, stereo glasses, and a large assortment of familiar science laboratory and home equipment.

The development and evaluation of ME AND MY ENVIRONMENT are described in five formative evaluation reports.[1,2,11,12,13] A guide to these formative evaluation reports appears on pp. 15-20 of this report. Other descriptions of the program have been published in a number of sources and are also available from the commercial producer.

The third science program in the sequence, ME IN THE FUTURE, was funded in 1975. It is under development now in preparation for field tests beginning this year. ME IN THE FUTURE will build on both preceding programs and will carry career-awareness and career-orientation objectives and activity patterns.

Notes on a Developmental Model

The curriculum development process is never briefly described. Aspects of the model adopted by the developers of ME AND MY ENVIRONMENT are reported in the program's Formative Evaluation Reports, but another opportunity proved more effective in elaborating on the process. The Biological Sciences Curriculum Study was assigned the responsibility for coordinating inter-project conferences on curriculum development involving the following curriculum projects for mentally retarded children:

Project I CAN
Michigan State University

Project MATH
University of Connecticut

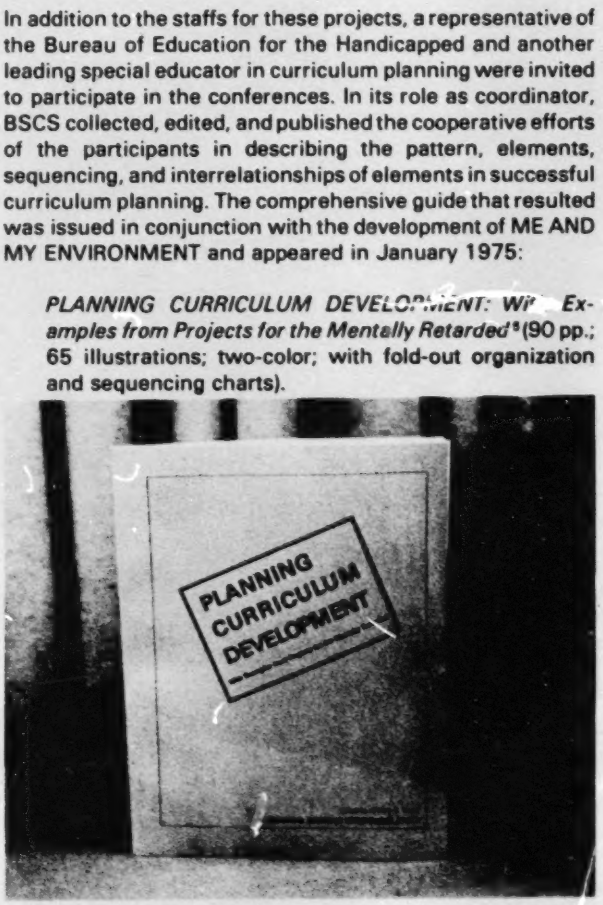
ME AND MY ENVIRONMENT
Biological Sciences Curriculum Study (BSCS)

Project MORE
University of Kansas

SOCIAL LEARNING CURRICULUM
Yeshiva University

In addition to the staffs for these projects, a representative of the Bureau of Education for the Handicapped and another leading special educator in curriculum planning were invited to participate in the conferences. In its role as coordinator, BSCS collected, edited, and published the cooperative efforts of the participants in describing the pattern, elements, sequencing, and interrelationships of elements in successful curriculum planning. The comprehensive guide that resulted was issued in conjunction with the development of ME AND MY ENVIRONMENT and appeared in January 1975:

PLANNING CURRICULUM DEVELOPMENT: With Examples from Projects for the Mentally Retarded[9] (90 pp.; 65 illustrations; two-color; with fold-out organization and sequencing charts).



The guide is available on a limited basis, in single copies without charge, upon written request to BSCS. It richly illustrates the curriculum development process in a manner so closely related to the BSCS development model[7] that only additional steps taken or options exercised by the developers of ME AND MY ENVIRONMENT are described in the following notes.

Foremost among the options exercised in the development model used by BSCS are these:

1. Although special educators are now part of the BSCS staff, an Advisory Committee of leading special educators throughout the United States guides the curriculum-planning and evaluation activities and reviews all project work.

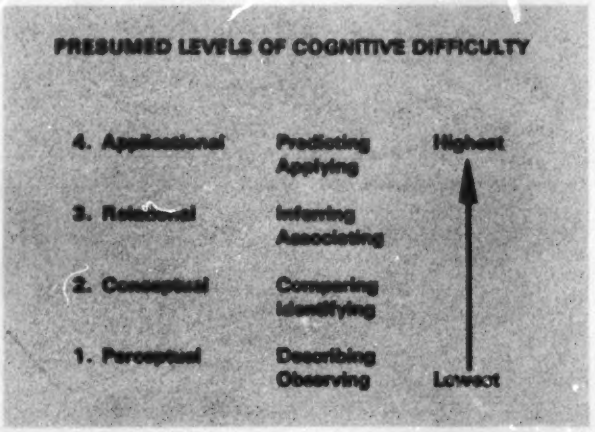
2. Although scientists and science educators are part of the BSCS staff, their counterparts from throughout the United States participate by invitation in the content review and revision of the curricular materials.

3. Although developers and writers are part of the BSCS staff (and have worked extensively on preliminary and revised editions of ME AND MY ENVIRONMENT), summer writing conferences are organized to enlist theoreticians and classroom teachers in science and in special education from throughout the United States *to share in the actual writing of the materials*.

These practices have been followed throughout the development of ME AND MY ENVIRONMENT. They were also followed in the development of ME NOW. They were considered essential and were set in operation long before Congressional inquiries into science curriculum development activities brought out certain criticisms of other large science curriculum development centers as "ingrown." BSCS is one of the largest of the science curriculum development centers. Its development model is projective or "outgrown" to involve far more participants from all geographic regions of the United States than it has on its own resident staff. Even the resident staff is periodically rotated, so that the term "resident" is not wholly appropriate.

The ME AND MY ENVIRONMENT staff is outnumbered by its Advisory Committee alone. It is *twice* outnumbered by the other scientists and science educators invited to review the content of the curriculum. It is *four times* outnumbered by the participating writers, and *six times* outnumbered by the field-test teachers. That valid national representation has resulted is partly indicated by the list of states from which participants have been selected: Massachusetts, New York, New Jersey, Pennsylvania, North Carolina, Florida, Kentucky, Tennessee, Ohio, Wisconsin, Illinois, Iowa, Missouri, South Dakota, Kansas, Colorado, Wyoming, Nevada, Utah, Montana, Washington, Oregon, and California. Almost half the states in the United States are included in the list; in addition, participants from Canada have also been involved.

In other elaborations on the curriculum development model, theoreticians and practitioners in special education, and theoreticians and practitioners in science and science education, have interacted at each step in the planning and work, from setting major aims and specific objectives to writing and revising materials. Of importance in these efforts have been research and surveys undertaken before the earlier development of ME NOW; in particular, accumulated evidence on cognitive levels of difficulty with respect to age and level of individual student development proved valuable in their association with science inquiry skills.



By setting aims and specific objectives *first*, in association with cognitive levels and science inquiry skills, the Advisory Committee and the developers followed closely the guidelines later outlined in PLANNING CURRICULUM DEVELOPMENT,[6] Chapter 1. To summarize this point, *all student and teacher's materials were developed and written to the specific objectives, and they were sequenced according to the levels and sequencing of subject matter as affected by cognitive and inquiry skills*. This led to an organization of ME AND MY ENVIRONMENT on somewhat other than an intuitively logical basis. Yet the result, with some tasks and concepts deferred a year or two for better cognitive assessment by students, proved entirely logical: environmental awareness began with self and the close environment and expanded gradually to a broader and broader concept of what environment is. (See the unit sequence in ME AND MY ENVIRONMENT, p. 6 of this report.)

Defining behavioral objectives is not a simple task, but the merits of defining them first, to make progress toward them measurable, can be inferred from the example reprinted on the following page, from Chapter 1 of PLANNING CURRICULUM DEVELOPMENT. (The particular objective under definition there, as the example, is in social learning at the "community level" of environmental awareness.)

The program aims and the objectives for ME AND MY ENVIRONMENT appear in the Introductions to the Teacher's Manuals. Any unit's manual may be consulted for this information and for the hierarchy of inquiry skills and other organizing elements.

As for the intended student tasks that will enable them to meet the defined objectives, other guidelines exist (and are well established) for activities of EMH students. Oliver P. Kolstoe lists six:[5]

1. The tasks should be uncomplicated. The new tasks should contain the fewest possible elements, and most of the elements should be familiar so that the student has very few unknowns to learn.

2. The tasks should be brief. This assures that the student will attend to the most important aspects of the tasks and not get lost in a sequence of interrelated events.

OBJECTIVES

Writing each objective is a separate challenge. By example, the following statement might be a unit aim but is unsatisfactory as an objective:

> **Aim or Objective?** Each student should recognize that the community offers services to all citizens.

Missing for the use of the statement as an objective are:

a. What kinds of services?
b. How is the student's recognition of them to be measured?
c. What is an acceptable level of recognition?
d. Under what conditions is the student to make the recognition?

Each of the four considerations may be used in planning a better objective:

a. If eight services are to be introduced and they are all offered by the police, fire, and public utility departments, the objective should say so.
b. The student should be asked by the objective to state or write the services, check them off a list or name them in response to questions, use them in writing a community "story," or otherwise provide some tangible, measurable evidence of knowledge of them.
c. The objective should state how many of the eight services (four, five, or more?) constitute an acceptable level of learning.
d. And the objective should clarify the conditions for demonstrating the learning—recall (without cues), written or oral response to questions, recognition from a list, or some other method.

A better statement of the objective, then, might be:

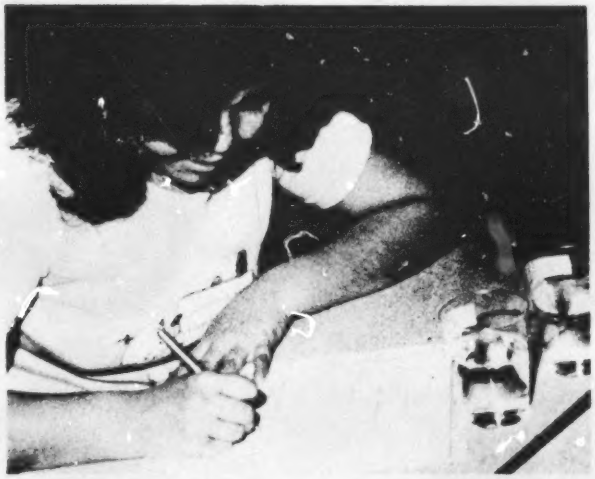
> **Objective:** Each student should name five or more community services and the department offering each—police, fire, or public utility—from a list of questions about eight community needs.

To deal with any problems of verbal perception, or with reading problems, the list of questions must be carefully prepared and reviewed. (Procedures for assessment and evaluation are referred to elsewhere, on pages 44-57.) Indeed, whether or not reading problems exist, an alternate statement of the objective for mentally retarded children could be:

> **Objective:** Each student should demonstrate the ability to contact police, fire, and public utility services and correctly identify circumstances when doing so.

References for preparing objectives are widely available (Gronlund, 1970; Mager, 1962; Bloom, 1956; Krathwohl, 1964). In some of these references, behavioral objectives are derived separately for

a. psychomotor behavior,
b. cognitive behavior, and
c. affective behavior.



3. The tasks should be sequentially presented so the learner proceeds in a sequence of small steps, each one built upon previously learned tasks.

4. Each learning task should be the kind where success is possible. One of the major problems to be overcome is that of failure proneness. This major deterrent to learning can be effectively reduced through success experiences.

5. Overlearning must be built into the lessons. Drills in game form seem to lessen the disinterest inherent in unimaginative drill.

6. Learning tasks should be applied to objects, problems, and situations in the learner's life environment. Unless the tasks are relevant, the learner has great difficulty in seeing their possible importance.

A seventh guideline was adopted with these six for the science activities in ME AND MY ENVIRONMENT:

7. The tasks should be intellectually honest. This assures that the students can succeed to the limits of their ability and not be held back by misjudged or predetermined assessments of their potential.

Each of the seven guidelines was applied to student tasks, with the last four of the seven proving pivotal at stages in the program. Success is often possible to initiate in a task that is considered isolated, yet as often the opposite is true—or the task is not isolated but is a "building block" to another that relates to a broadening concept for the student. Here overlearning can become a plan—a tool—as "built-in" redundancy. Worksheets, "hands-on" experiments, games, tapes, filmstrips, and other learning situations or aids can focus on overlapping examples of the same, or similar, concepts; each is directed at a mode of learning employing a somewhat different set (or subset) of the human senses than its companion aids may stimulate. Built-in redundancy then becomes a multi-media, multi-sensory environment for learning.

For example, *observing* is a fundamental skill. The accumulation of information which leads to knowledge comes primarily from what we see, hear, taste, smell, or touch. A major function of the curriculum is to offer a rich and varied environment of concrete experiences to the students. As they gain experience and training, they gain in accuracy of observing and recording details of their findings. Inquiry and process skills provide them with a tested mechanism for finding and doing on their own, for actively increasing their fund of knowledge.

The following set of activities exemplifies how process skills are developed. *Observing* can again serve as the example. Students experience a discrepancy in apparently similar events as ice cubes are put in two liquids which seem identical. In one, the cubes sink and rest on the bottom; in the other, they float. Through a series of "hands-on" observations and tests, the students discover that the two liquids are in fact quite different. The activity provides experience in recognizing appropriate clues to reach a conclusion that may differ from assumptions or expectations. The lesson?—the more information that is gathered, the more accurate will be the conclusion.

The same lesson is learned in another activity approached in a different sensory way, through sound. Isolated sounds are first heard, and then the sources are observed in a sound filmstrip, *Some Sounds*. Before the sources of the sounds are seen, however, students are invited to make observations and ferret out clues to the identity of an environment from the sound alone. So many clues are common to different environments that at times the correct clues are accumulated only by listening carefully to *all* the sounds from one environmental spot. A series of eight environments are explored one by one in another sound tape, *Environmental Orchestra*. Students are then asked to form a mental picture of what they heard.

Still another approach is used toward a similar end. The filmstrip *Zoom In..., Zoom Out* illustrates that there are many more aspects of the environment than people ordinarily notice. These aspects can become apparent by close and careful observation. Objects viewed very closely reveal textures and patterns not usually seen. Not until they are viewed from successively farther away do they take on their everyday appearance—but at the same time they lose their informative detail.

formative evaluation for ME AND MY ENVIRONMENT

Decision-making: Formative vs. Summative

Evaluation attempts to control variables and assess a program's value or success. It faces one insurmountable problem: the variables are too many. There are too many in curriculum and materials preparation alone. There are too many again in teaching, too many in learning, and too many in the physical environment in which the learning takes place. An evaluation program that attempts to control even a handful of these variables may dwarf the rest of the curriculum effort in time, staff, and cost.

Nowhere else in curriculum development are more, or more painful, choices necessary—and first among them is the type of evaluation sought:

1. *Formative evaluation* is the systematic assessment of steps in curriculum development to determine the effectiveness of content, strategies, format, and media and to maintain feedback necessary to revising the curriculum and its materials.

2. *Summative evaluation* is the final testing of the curriculum and its materials in the educational marketplace—that is, in widespread use in the schools.

One type of evaluation informs the curriculum developers; the other, the educational community at large. One does not reflect the final program but only stages in its evolution; the other assesses the entire program once it has emerged.

For the developers of ME AND MY ENVIRONMENT the choice was dictated by the untested combination of two otherwise familiar entities:

- special education students, and
- science

Formative evaluation is a learn-and-hone-as-you-go process, and it is fortunate that its choice, over summative evaluation, was so clearly signaled. Even some of the "best-tested" assumptions about special education students proved inaccurate for the field-test population. As an example, expectancy on some tasks that involved physical manipulation or manual skills was predicted at less than the 50 percent level of success, because perceptual-motor (eye-hand) coordination was postulated as a major problem for the students. Yet in the field tests, the children often performed at the 80 percent level, or better, on some of these tasks.

On other tasks the opposite was as often true. The children would perform at the 25 percent level, or possibly 33 percent, on tasks that the developers, on the basis of then currently held hypotheses, felt to be of a potentially high success rate.

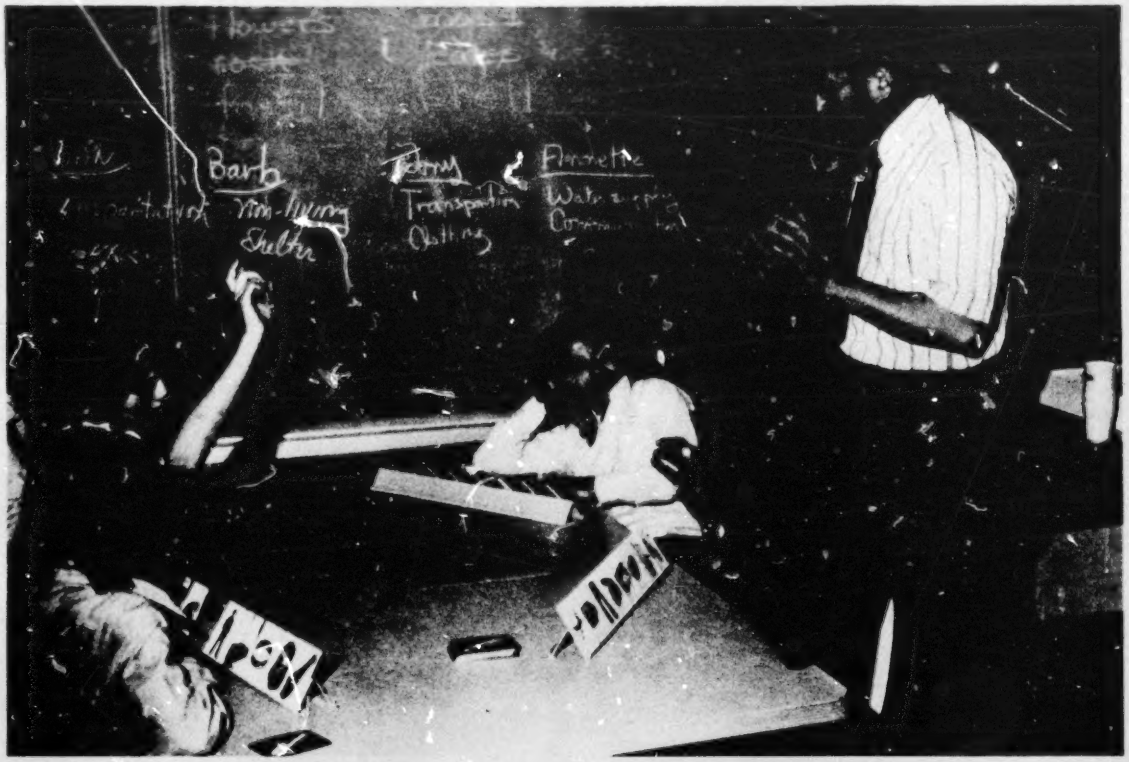
The value of so many stages in development and revision, with two sets of field tests (except for Unit 5), and the two successive revisions of the curriculum and its materials after these field tests, was quickly demonstrated. Largely because the final form of the curriculum and its materials was a "third edition," occasional-to-frequent frustrations and failures could be turned to measured degrees of success by additions to, omissions from, and revisions of the program.

Everybody learned—not only the developers, but the children and their teachers, as the letter on page 11, from a field-test teacher, indicates.

Generalizations about the students took qualified forms. The children were not always of short attention span, and their thinking proved sequential despite some noticeable "gaps" by comparison with other student populations of comparable age. (At times material would be moved ahead in the program, to appear when the students would be a half-year or a year older. In these cases the learning was frequently demonstrated to be more closely related to functional ability-with-age than to IQ.)

Successes and disappointments and the decisions attending them are described in the context of the materials, their field tests, and their evaluation in Formative Evaluation Reports 1 through 5,[1,2,11,12,13] and a guide to those reports follows on pp. 15-20. It remains to state the project's conclusion—that science for the EMH population is possible, practicable, and valuable. It is attended (as with instruction in all subjects for EMH students) by failures that will require the same input in attention to individual students that other learning failures make mandatory. But almost all of the students (up to 85 percent in the field tests) can achieve frequent, marked success; and, by groups, the expectancy for sustained, *sequential* successes now stands at considerably better than the 50 percent established for the second field tests. This minimum standard of success had been exceeded even before the final revision of ME AND MY ENVIRONMENT for commercial production, release, and use by EMH special education classes anywhere

The summative evaluation, if it is made, will be made by other evaluators for a program that now consists of 5 Teacher's Guides totaling 1,937 pages, 139 student worksheets, 263 slides, 9 filmstrips and sound filmstrips, 6 tape cassettes, 6 student booklets, 4 board games and other games, 2 wall posters, 6 sets of study prints, 30 stereograms, hundreds of kit items and other materials ranging from working models to science apparatus and supplies, and numerous files of evaluation data as well as six formative evaluation reports.

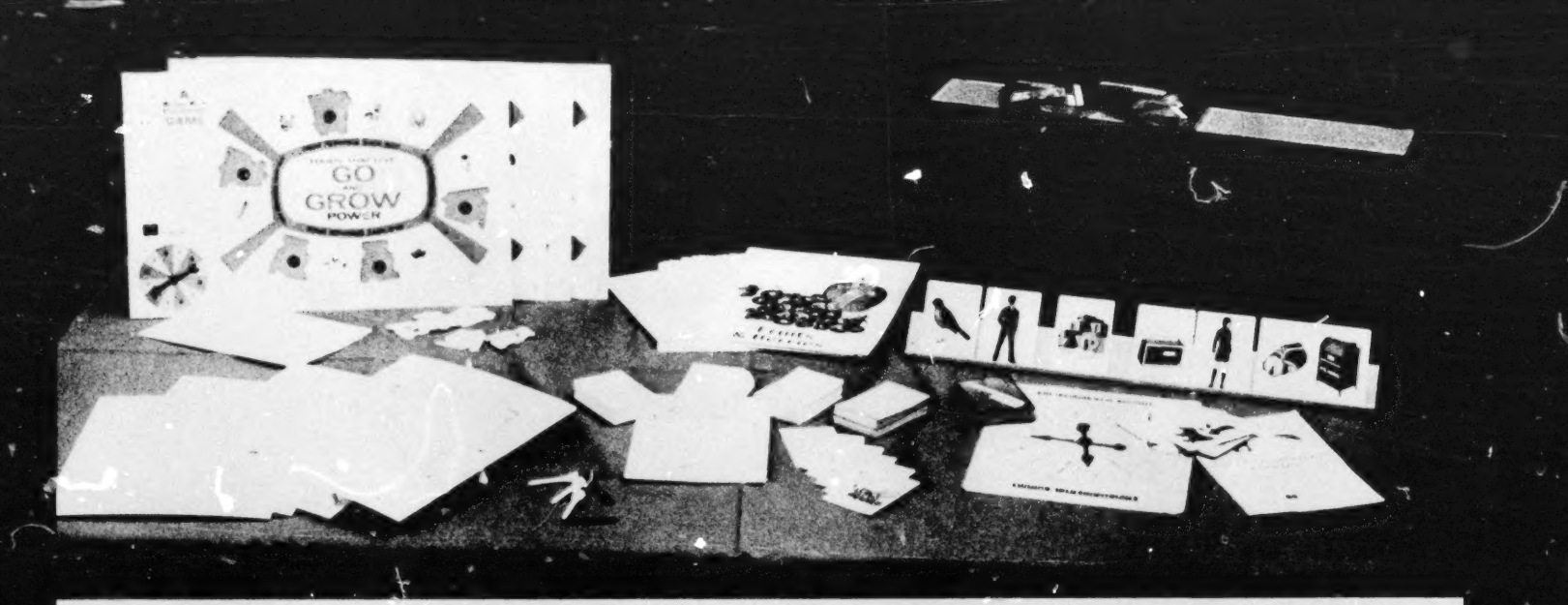


To the EMH staff:

There's no way to end this testing program without saying a few words to each of you. Is it possible for you to realize exactly what your dream has accomplished? Or did you feel it would be this way? You must have been very discouraged when the fourteen of us came to the first orientation session. We were all so sure that you were talking over the children's heads and that they would become frustrated. I don't mind admitting that I was frustrated also because I didn't really understand one bit of what was going on. It had been so long since I had to do certain kinds of thinking that, well, I guess just face it, I was ignorant and afraid that I would be unable to keep from falling flat on my face in front of the children. That seemed important at the time. However, after I got started it didn't matter one bit. Just as you said. Also, a syndrome of "She's a special education teacher" probably kept me from wanting to try out new things. As I think about it now, the wish to stay in my own little corner and do my own thing was determined by the feelings of the general public and lots of educated people now still say that the teacher of the retarded must be retarded also. The many times I had wished for bigger and better things for my children were a continuous fight and I was always being told that "we have the whole school to think about and your children are just a little part of it." You must have met that same kind of disappointment when you were writing for us. I'm just most sure no one would understand why with all the brilliance you have you were willing to write for the retarded. I would suppose that it's not much of a problem to write for the normal or talented, so this really was a dream. There was wisdom and understanding in the conception of your ideas, even when some of the ideas were not practical to entertain in the goals you thought necessary. They were met in another manner, however, other than the experiment you had designed sometimes. I feel that you, along with all the rest, should know that what began as a dream or hope or vision for you was unmeasurable in gains. The children who remained in the program have a lighter, surer step. They are confident in discussing their experiments and using their big vocabularies all over the place. There is no hesitation when asking for opinions and seemingly no more caged-up feelings. It would seem that I was wrong, then, about the frustrations. For example, a discussion on having children was held between two of my girls and two of their friends in regular grades. I'm sure you would appreciate their comments. My girls said, "Well, I'm not going to have a whole lot of babies 'cause there are too many people already. You can't even swim in Stratford Lake now, so much junk is in it." Later I asked the two what their discussion was about and the gist of their answer was that they both realized there are so many people who don't care what they do with junk, garbage, and so forth. To me this is an awareness that man has a responsibility, both to himself and others, to preserve his environment. This is stated rather simply I know, but, oh how hard it was for the students and myself to come to this realization. As for myself, you know I even had the nerve to disagree with both the concept and the manner of presentation. Sometimes I now can prove what I am saying with the background information I have acquired, so you see BSCS has been a really good teacher. From a rocky start and the even harder road, both the students and I are learning as well as enjoying science. Our program is approved by the administration, and that in itself is a major obstacle removed. It was a good piece of work and I think all of you at BSCS should be proud.

Love, Mary

Mary Smith
Shepard Jr. High School
Durham, North Caroiina



published materials in ME AND MY ENVIRONMENT

Title	Category	Length	Unit
EXPLORING MY ENVIRONMENT	Teacher's Instructional Guide	568 pp.	1
	Student Worksheets	44 pp.	1
	Daylight Blackboard Projection* Slides	60 slides	1
Some Plants...A look at variety	Study Cards	16 cards	1
	Supplementary Teacher's Guide	4 pp.	1
Some Animals...A look at variety	Study Cards	16 cards	1
	Supplementary Teacher's Guide	4 pp.	1
Some Houses...A look at varied environments	Filmstrip	33 frames	1
	Supplementary Teacher's Guide	8 pp.	1
Zoom In..., Zoom Out: Environmental discoveries with the eye	Filmstrip	74 frames	1
	Supplementary Teacher's Guide	8 pp.	1
Some Sounds...A guide to environmental listening	Filmstrip	32 frames	1
	Tape Cassette	30 min.	1
	Supplementary Teacher's Guide	8 pp.	1
Environmental Orchestra: Investigating the environment through hearing	Tape Cassette	30 min.	1
	Supplementary Teacher's Guide	12 pp.	1
Science Is...	Poster	2 × 3 ft.	1
Environmental Rummy: A classification card game	Game	72-card deck	1
	Supplementary Teacher's Guide	4 pp.	1
ME AS AN ENVIRONMENT	Teacher's Instructional Guide	358 pp.	2
	Student Worksheets	27 pp.	2
	Daylight Blackboard Projection* Slides	18 slides	2
What Do You See?...Environmental discoveries in three dimensions	Stereo Study Cards	30 cards	2
	Supplementary Teacher's Guide	8 pp.	2
Mind Puzzlers: A mental challenge	Study Cards	20 cards	2
Scrub and Spray the Microbes Away: A look at personal hygiene	Filmstrip	39 frames	2
	Tape Cassette	30 min.	2
	Supplementary Teacher's Guide	8 pp.	2
Drugs: Use and Misuse: An environmental choice and chance	Filmstrip	34 frames	2
	Tape Cassette	30 min.	2
	Supplementary Teacher's Guide	12 pp.	2

Title	Category	Length	Unit
Drugs: Use and Misuse	Student Booklet	24 pp.	2
What You Should Know About VD	Student Booklet	48 pp.	2
ENERGY RELATIONSHIPS IN MY ENVIRONMENT	Teacher's Instructional Guide	293 pp.	3
	Student Worksheets	34 pp.	3
	Daylight Blackboard Projection® Slides	59 slides	3
Who Eats Whom?...A series of food chain flash cards	Study Cards	22 cards	3 & 4
	Supplementary Teacher's Guide	4 pp.	3 & 4
Seeking the Source: A look at the source of all food	Filmstrip	30 frames	3 & 4
	Tape Cassette	15 min.	3
	Supplementary Teacher's Guide	8 pp.	3
Food Chain Game: Decks of playing cards on energy transfer	Game	72-card deck	3 & 4
	Supplementary Teacher's Guide	8 pp.	3 & 4
Go and Grow Game: A balanced diet puzzle	Game	4 puzzle boards	3
	Supplementary Teacher's Guide	4 pp.	3
Food Web	Game	3 playing boards	3 & 4
High Flyer	Game	1 playing board	3
RAMPant Energy	Game	1 ramp/track kit	3
Nature's Delicate Balance	Student Booklet	16 pp.	3
TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT	Teacher's Instructional Guide	338 pp.	4
	Student Worksheets	28 pp.	4
	Daylight Blackboard Projection® Slides	70 slides	4
Some Cycles...A look at repetition	Study Cards	22 cards	4
	Supplementary Teacher's Guide	8 pp.	4
I'm the Very First Link: A look at recycling	Filmstrip	65 frames	4
	Tape Cassette	30 min.	4
	Supplementary Teacher's Guide	12 pp.	4
Anyone Can: A study in recycling	Game	1 board	4
	Supplementary Teacher's Guide	8 pp.	4
The Long Journey	Student Booklet	32 pp.	4
WATER AND AIR IN MY ENVIRONMENT	Teacher's Instructional Guide	380 pp.	5
	Student Worksheets	37 pp.	5
	Daylight Blackboard Projection® Slides	56 slides	5
The Water Cycle: Where it comes from	Study Cards	10 cards	5
	Supplementary Teacher's Guide	4 pp.	5
Water in My Environment: Its Use	Filmstrip	75 frames	5
	Supplementary Teacher's Guide	8 pp.	5
Water in My Environment: Its Abuse	Filmstrip	52 frames	5
	Supplementary Teacher's Guide	8 pp.	5
Air in My Environment: Clues, Uses, Abuses	Filmstrip	75 frames	5
	Supplementary Teacher's Guide	8 pp.	5
Water	Poster	2 × 3 ft.	5
The Water Cycle in Nature	Poster	2 × 3 ft.	5
Air	Poster	2 × 3 ft.	5
The Fate of the River	Student Booklet	16 pp.	5
The Water Cycle: Operating model	Model	Assembled kit	5
	Supplementary Teacher's Guide	4 pp.	5

References

[1]Callahan, William P. *Assessing Student Abilities and Performance: Year 3. ME AND MY ENVIRONMENT Formative Evaluation Report 5.* Boulder, Colorado: Biological Sciences Curriculum Study. January 1976. 33 pp.

[2]Gromme, Roy O. *Assessing Student Abilities and Performance: Year 2. ME AND MY ENVIRONMENT Formative Evaluation Report 4.* Boulder, Colorado: Biological Sciences Curriculum Study. May 1975. 32 pp. (ED 112623) (EC 080112)

[3]Grossman, H. J. (Editor), *Manual on Terminology and Classification in Mental Retardation*, Special Publication Series No. 2, American Association on Mental Deficiency. 1973. p. 135.

[4]Hoyt, K. B., "Career Education and the Handicapped Person," public address; *see also* Hoyt, K. B., *Career Education: Contributions to an Evolving Concept.* Salt Lake City: Olympus Publishing Company. 1975. p. 21.

[5]Kolstoe, Oliver P. *Teaching Educable Mentally Retarded Children*. New York: Holt, Rinehart and Winston. 1970. pp. 22-23

[6]Mayer, William V., (Editor), *PLANNING CURRICULUM DEVELOPMENT: With Examples from Projects for the Mentally Retarded.* Boulder, Colorado: Biological Sciences Curriculum Study. 1975. 90 pp. (ED 107020) (EC 072489)

[7]Ibid., pp. 23-33.

[8]*ME AND MY ENVIRONMENT, Environmental Sciences: A Special Education Program.* Boulder, Colorado: Biological Sciences Curriculum Study. 1973-76. Distributed by Hubbard Scientific Company, P. O. Box 105, Northbrook, Illinois 60062.

[9]*ME NOW, Life Sciences: A Special Education Program.* Boulder, Colorado: Biological Sciences Curriculum Study. 1972. Distributed by Hubbard Scientific Company, P. O. Box 105, Northbrook, Illinois 60062.

[10]Robinson, James T. and Richard R. Tolman. *A Formative Evaluation of ME NOW, Unit 1, Digestion and Circulation.* Boulder, Colorado: Biological Sciences Curriculum Study September 1970. 97 pp. (ED 043182) (EC 030165)

[11]Steele, Joe M. *Arranging Field Tests: Characteristics of Sites and Students. ME AND MY ENVIRONMENT Formative Evaluation Report 1.* Boulder, Colorado: Biological Sciences Curriculum Study. June 1973. 29 pp. (ED 087190) (EC 061292)

[12]———, *Assessing Student Abilities and Performance: Year 1. ME AND MY ENVIRONMENT Formative Evaluation Report 2.* Boulder, Colorado: Biological Sciences Curriculum Study. December 1973. 48 pp. (ED 087191) (EC 061293)

[13]———, *Design and Revision, Data Collection and Portrayal. ME AND MY ENVIRONMENT Formative Evaluation Report 3.* Boulder, Colorado: Biological Sciences Curriculum Study. September 1974. 53 pp. (ED 100123) (EC 071063)

[14]Tolman, Richard R. *A Formative Evaluation of ME NOW, Life Sciences for the Educable Mentally Handicapped, Final Report.* Boulder, Colorado: Biological Sciences Curriculum Study. December 1972. 305 pp. (ED 071263) (EC 0508710)

1
arranging field tests characteristics of sites and students
2
assessing student abilities and performance: year 1
3
design and revision, data collection and portrayal
4
assessing student abilities and performance: year 2
5
assessing student abilities and performance: year 3
FINAL FORMATIVE EVALUATION REPORT
a synthesis of findings
5 4 3 1 2

guide to
the formative evaluation reports

For information on...	See Formative Evaluation Reports(s)... Number(s)	Page number(s)	Text, Table(s) or other	Description or Summary
Areas of need in the EMH population	3	7	Table	Areas of need as identified in the Yeshiva University study underlying the SOCIAL LEARNING CURRICULUM.
Aspirations of EMH students in Field Test I classes	1	23	Text and table	Sample size: 74. Method of determining aspirations of students: interview. Summary: three-fourths had realistic aspirations, but one-fourth aspired to occupations requiring education beyond high school.
Design of the ME AND MY ENVIRONMENT curriculum and products:				
curriculum design considerations	2	9-10	Text	Describes assumptions and the task in terms of the training and experience of the people to be involved.
formative evaluation in curriculum development	1	3	Text	Early consideration of the necessity for and purposes of evaluation.
planning materials production	3	6-8	Text	Summer writing conferences; the task of writing to specific objectives; major changes in content and organization during development.
rationale for organization of curriculum content	2	4-5	Text	Educational expectancy; aims and objectives; basic assumptions underlying preparation of materials.
timetable for development and evaluation	1 2	4-5 2	Table Table	Calendar of anticipated events.
Data for evaluation:				
background data on students and classes	1	14-29	Text with 6 tables and classroom photographs	Age, sex, IQ, and ethnic data on students; grouping and housing of students in Field Test I classes; criteria for placement in EMH classrooms; teachers' descriptions of students; aspirations of students.
collection of data	3	30-38	Text with 4 tables, 7 figures, and photographs	Concerns, problems, and costs of data collection; tables of data; classifications of data from teachers, students, and observers.
data payoffs and trade-offs	3	50-52	Text	Payoffs to the developers and certain other audiences as compared to audiences for whom the data and evaluation are not designed (i.e., audience trade-offs); other payoffs and trade-offs in specific judgments on data.
development of test items	2	8-13	Text with 3 tables and 10 examples of test items	Rationale for paper-and-pencil test or performance items; examples of items; cueing students to the correct page and question; detection of flaws in items; assessment of Field Test I items as too broad and not contributing to specific activity revisions in student materials; redesign of items for Field Test II to inform developers at more frequent intervals and in greater specificity.
long-term retention of concepts	4	12-13	Text with graph	Comparison of short-term and long-term retention of concepts from activities requiring performance mastery; use as baseline data for redundancy in instruction with later units.

For information on...	See Formative Evaluation Report(s)... Number(s)	Page number(s)	Text, Table(s) or other	Description or Summary
Data for evaluation (cont.):				
organization and uses of data	3	39-41	Text	Planning and reviewing the task of data collection; organization procedures; decision criteria; processing data.
performance data (*See* Student performance on items assessing instruction)				
pretests of functional ability	2	14-26	Text with 13 tables, 21 examples of test items, 1 figure, and photographs	Functional ability tests in four areas (problem-solving, cognitive development, grouping or sorting, and prerequisite knowledge) were designed and administered; later performance of the students with the curricular materials and on performance items indicates functional ability as a more effective predictor of success than IQ scores.
pretests and retests of functional ability	4	30-31	Text	Functional ability vs. intelligence testing is reviewed; four papers are cited and summarized.
purposes and interpretation of student data	2	6-7	Text	Sources of data (teachers' judgments, classroom observers' notes, interviews with students, student scores from test items and performance tasks, etc.) and their use in formative evaluation are related to judging a curriculum.
revised means of monitoring or testing—"Clues to Success" activities	4	4-5	Text	Summary of advantages of frequent, specific testing in a format that students accept as "another science activity"; shortcomings of this format and its use.
sources of data	2 2 3 3 3 3	6-7 14-26 11-12 14-16 17-18 19-24	Text Text with 13 tables, test items, and figures and photographs Text Text Text Text with 8 tables	Description of sources of data: teachers' judgments; classroom observers' notes; interviews with students; student tests and performance tasks; tests of functional ability; goal-free evaluation; BSCS staff reviews; content reviews by experts; matrix analysis of the curriculum.
Evaluation:				
design for data collection and evaluation	1 1	3 4-5	Text Text with figure	The purpose of formative evaluation, and a design for data collection and evaluation, are summarized.
development of paper-and-pencil items (*See* Data for evaluation: development of test items)				
formative vs. summative evaluation; purposes of formative evaluation	2 3 4 5	7 2-3 3&32 3	Text Text Text Text	Formative evaluation informs developers and guides revisions; summative evaluation occurs too late to guide revisions, but informs other audiences; the choice of the one over the other, for use in the development of ME AND MY ENVIRONMENT.
goal-free evaluation	3	14-16	Text	Values obtained from review of the curriculum materials by an evaluator who had no knowledge of the aims or objectives.

For information on...	See Formative Evaluation Reports(s)... Number(s)	Page number(s)	Text, Table(s) or other	Description or Summary
Evaluation (cont.):				
major questions for the evaluation of ME AND MY ENVIRONMENT	1	6-7	Text with table	A summary and listing of the questions addressed in evaluation.
matrix analysis of the curriculum	3	19-24	Text with 6 tables	Graphic analysis by matrix methods reveals every student activity in which each inquiry skill is developed or used, each developmental ability employed, each problem-solving skill developed or applied, each environmental theme emphasized, each manner of individual or group work employed, and each degree or type of student involvement indicated (for the latter, in- or out-of classroom, "hands-on" or semiabstract work, filmloops, discussions, etc.). The entire curriculum with all its units and activities can be mapped for quick reference according to a useful number of different indices.
performance data (*See* Student performance on items assessing instruction)				
purposes of field tests	1	6	Text	Four purposes of initial field tests.
regression analysis in tests of functional ability	2	23-24	Text with 3 tables and 1 figure	Forcing IQ into the regression equation first did not result in half or more of the variance in student performance being explained by differences in IQ scores; various tests of functional ability explain more of the variance.
sources of data (*See* Data for evaluation: sources of data)				
student understanding of science concepts	1	4	Text	A summary of student performance on Field Test I, Units 1 and 3 (designated Unit 1 and Unit 2, Part I, in preliminary edition); these first results were used in setting levels of expectation for continued development and field-testing of the curriculum.
systems approach to evaluating the curriculum-development and evaluation design	5	22-30	Text with 10 figures	The breakdown of a complex curriculum-development and evaluation process into subsystems for further study.
Field-test sites:				
selection of sites	1	8-11	Text with table and photographs	Physical and performance criteria for the selection of sites for Field Tests I and II. (Teachers and school administrators signed contracts to meet performance criteria.)
students and classes (*See* Data for Evaluation: background data on students and classes)				
teachers and schools	1	12-13	Listing with map and photographs	Names of teachers and school addresses for Field Tests I and II.
	2	48	Listing with map	
	4	32	Listing	
	5	32	Listing	

For information on...	See Formative Evaluation Reports(s)... Number(s)	Page number(s)	Text, Table(s) or other	Description or Summary
Mini-field test of "Anyone Can"	5	20-21	Text with photographs	One of many educational games developed for the curriculum is followed through its development and field-testing.
Revision of the curriculum:				
abstract of three editions correlated with field tests	4	5	Table	Listing of first and second experimental editions and commercial (third) edition, with titles of all units and dates of their field tests.
BSCS Staff reviews	3	17-18	Text	Following field tests, data collection, and evaluation, comprehensive staff reviews were completed to guide the revisions.
case histories of revision techniques	3	25-29	Text with table and 2 figures	Unit 1 of ME AND MY ENVIRONMENT is followed into revision, as an example of the revision processes.
	4	25-26	Text with photograph	A small group of activities is selected as another example and followed through revision to increase variety in instruction and media and to help students relate photographs to their three-dimensional subjects.
	5	18-21	Text with 9 photographs	The need for more emphasis on the environmental theme of recycling is followed to the evolution of a sound filmstrip in the revised materials (*I'm the Very First Link*)—another example of a revision technique.
content reviews by experts	3	11-13	Text with table	Scientists and special educators reviewed the preliminary editions of ME AND MY ENVIRONMENT and raised questions affecting their revision.
evaluation (*See* Evaluation)				
interpretation of results on performance items	2	28	Text	The estimates of the developers and the performances of the students were contrasted and compared for an overview of results on test items. The differences indicated topics and areas for revision.
major ideas used in revision	3 3 3	8 13 17-18	Text Table Text	Summarizations of the direction and thrust of revisions.
use of matrix analysis to guide revision (*See* Evaluation: matrix analysis of the curriculum)				
Setting standards for student performance	2 3 4 5 	4 41 6-7 14 22 5 11	Text Text Text with graph Graph Text with graph Text with graph Text with graph	Staff standards of acceptable student performance; the use of staff standards as criteria; summaries and graphs comparing staff standards with actual performance by the students; usefulness of staff standards as nonprejudicial reference points in interpreting student performance. (*See* student performance on items assessing instruction, for staff standards on individual paper-and-pencil items in each unit of instruction.)

For information on...	See Formative Evaluation Reports(s)... Number(s)	Page number(s)	Text, Table(s) or other	Description or Summary
Student performance on items assessing functional ability (*See* Data for evaluation: pretests of functional ability, and pretests and re-tests of functional ability)				
Student performance on items assessing instruction: items assessing Units 1 and 3 (designated Unit 2 and Unit 2, Part I, in preliminary edition), Field Test I	2	27-45	Text with 8 tables and 25 examples of performance items	Data is reported for 13 field-test classes for Unit 1 and 10 classes for Unit 3; some items were found defective, based on student responses or on interviews with students; 25 items were retained for analysis in Unit 1 and 19 items in Unit 3; characteristically, correct responses were at the 50 percent level or above with exceptions for map reading, drawings to scale, etc.; evaluation demonstrated that items and responses were usually broader in concept than ideal for guidance in revision of specific student activities in the curriculum; because the items were used in pre- and post-tests only, the results for the latter were processed too late to guide the first revision.
items assessing Unit 1, Field Test II	4	6-13	Text with 5 tables, 2 graphs, and 22 performance items or descriptions	Data is reported for 17 field-test classes; items were administered at intervals throughout the unit (in "Clues to Success" activities), and results were processed in time to guide the second revision; performance varied from 25 to 90 percent on 22 items analyzed; 40 percent of items had qualified credit for one or more responses other than the "most correct"; for 18 of the 22 items, students performed at or above the 50 percent level; of the 14 items similar to those in Field Test I, performance on 12 was higher than in Field Test I.
items assessing Unit 2, Field Tests I and II	4	21-24	Text with 3 tables, 1 graph, and 11 examples or descriptions of items	Both field tests assessed students on the same edition of the materials for the curriculum, and the results were pooled for all classes; items were administered at intervals throughout the unit (in "Clues to Success" activities), and results were processed in time to guide the final revision of the unit; 11 items were analyzed, and students performed above the 50 percent level on all but one, going as high as the 96 percent level on one.
items assessing Unit 3, Field Test II	4	13-21	Text with 5 tables, one graph, and 29 examples or descriptions of items	Data is reported for 17 field-test classes; items were administered at intervals throughout the unit (in "Clues to Success" activities), and results were processed in time to guide the final revision of the unit; 29 items were analyzed, and students performed at or above the 50 percent level on all but three; performance on 7 items similar to items in Field Test I was the same or higher on 6.

For information on...	See Formative Evaluation Reports(s)... Number(s)	Page number(s)	Text, Table(s) or other	Description or Summary
Student performance on items assessing instruction (cont.):				
items assessing Unit 4, Field Tests I and II	5	4-10	Text with 3 tables, 1 graph, and examples or descriptions of items or groups of items	Data is reported for 14 classes for Field Test I and 14 classes for Field Test II (with the latter classes containing 90 more students); items were administered at intervals throughout the unit (in "Clues to Success" activities), and results were processed in time to guide two successive revisions; 20 of 75 items remained essentially the same in both field tests and were compared for responses; performance varied from 33 percent to 80 percent on items, with recycling of materials indicated as an environmental theme in need of more emphasis in revision of the student activity materials.
items assessing Unit 5, Field Test I	5	10-16	Text with 3 tables, figures, and examples or descriptions of items or groups of items	Data is reported for 7 field-test classes; items were administered at intervals throughout the unit (in "Clues to Success" activities), and results were processed in time to guide the revision of the unit; 24 sample items are reported from a total of 112, representing items for which data from all classes was complete; in 20 of the 24 cases, students reached or exceeded staff standards. Incomplete response or failure to administer items from the balance of those available was related to student attendance, variance in class progress, and the nature of the unit (the unit *Water and Air in the Environment* has the most expanded model of the environment in the ME AND MY ENVIRONMENT program).
Survey of EMH students on smoking, drinking, and drugs	4	27-29	Text with 8 tables and illustration of questionnaire	The topics of tobacco, alcohol, and drugs are part of Unit 2 of ME AND MY ENVIRONMENT; a questionnaire was administered to students before and after their introduction to the unit, in both Field Test I and Field Test II; the attitudes of the students toward the use of tobacco, alcohol, and drugs did not change significantly after instruction.
Teacher and classroom portrayals ("Sugar" vs. "Medicine")	3	42-49	Text with examples of classroom activities and with photographs	Teacher variables are never under control in field tests despite criteria used in selecting field-test sites (*See* Field-Test sites: selection of sites); the curriculum developers undertook the role of observers to report on contrasts between different classrooms.
Teachers' descriptions of students	1	16, 18, 20, 22, 24-29	Text with photographs	Examples of teachers' descriptions of students are given, preceded by directions from the curriculum developers on information sought; the teachers' descriptions were given in advance of the field tests.
Teachers' ratings of students:				
directions and definitions for ratings	2	15	Listing	Teachers were asked to rate students as part of the data feedback; agreement on use of terms and number and types of categories was established before the first ratings were made.
judgments and ratings as source of data	2 3	7 33-35, 37	Text Text with table and with 7 figures	A summary of teacher judgments and assessments and their cost in time and money; specific tasks and the forms used for reporting are described and illustrated.

FIELD-TEST TEACHERS

Field Test I

Larry Allen
Sentinel High School
Missoula, Montana

Vincent Alvino
Goleta Valley Jr. High
Goleta, California

Dannette Fitzgerald
Nevin Platt Jr. High
Boulder, Colorado

Jo Ann Jeppson (71-72)
Michael Rae (72-73)
Granite Park Jr. High
Salt Lake City, Utah

Steve Johnson
Central School
Missoula, Montana

Wallis Kiryluk
Cole Jr. High
Denver, Colorado

Candace Light (71-73)
Mary Freeman (73-74
Hodgkins Jr. High School
Westminster, Colorado

Cecil Linder
Roosevelt Jr. High
Eugene, Oregon

Richard Mathis
Shadowlawn Learning Center
Arlington, Tennessee

Edward McCann
Mon Valley School
West Mifflin, Pennsylvania

Tom Rodgers
Garside Jr. High
Las Vegas, Nevada

Mary Smith
Shepard Jr. High
Durham, North Carolina

Fred Strickland
Nathan Weeks Jr. High
Des Moines, Iowa

August Zeitlow (71-72)
Carla Watts (72-74)
UNC Laboratory School
Greeley, Colorado

Field Test II

June Allbrandt
Lake Jr. High
Denver, Colorado

Alice Bigham
Aycock Jr. High
Raleigh North Carolina

Chaminade Farmer
Gibson Jr. High
Las Vegas, Nevada

Sheldon Fine
C. I. S. 148
Bronx, New York

Carl Hoff
Lafayette Middle School
Lafayette, Colorado

Alma Jenkins
Skiles Middle School
Evanston, Illinois

Mollie Kite
Pathfinder School
Bethel Park, Pennsylvania

Vito Lombardo
F. D. R. Jr. High
Bristol, Pennsylvania

Douglas McCullough
L. Y. Cairns Vocational School
Edmonton, Alberta, Canada

Edward McNulty
Eastwood Jr. High
Syracuse, New York

Joan McNulty
Central Jr. High
DeWitt, Iowa

Eva Reedy
Benjamin Franklin Jr. High
San Francisco, California

Edward Sherman
I. S. 131
Bronx, New York

Howard Shipley
Judson Hill School
Morristown, Tennessee

Edith Shipman
Pacific Prevocational School
Seattle, Washington

Betty Silverthorn
Selah Jr. High
Selah, Washington

Joseph Sousa
Harrington Way Jr. High
Worcester, Massachusetts

Hilda Thach
Pierson Jr. High
Kansas City, Kansas

Susan Thomasgard
Merrill Jr. High
Denver, Colorado

Mary White
Shawnee Jr. High
Louisville, Kentucky

Sue Wright
West Locust Elementary
Wilmington, Ohio

Me and My Environment

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